IN THE CLAIMS

1. (Original) A bandwidth allocation device for an Ethernet Passive Optical Network (EPON) including an optical line termination (OLT), an optical distribution network (ODN), and a plurality of optical network units (ONU),

wherein the optical line termination includes a Multi-Point Control Protocol (MPCP) allocator, and the optical network unit includes an MPCP requester,

said MPCP allocator including:

a class-based queue state counter which differentiates the optical network unit, upon receipt of a control message for upstream report (REPORT) from a Medium Access Control (MAC) control layer, and obtains class-based queue length information of the optical network unit; and

a grant generator which, when queue state information of all the optical network units is obtained through the class-based queue state counter, generates a service-based bandwidth for each of the optical network units, and transmits a control message for upstream bandwidth allocation(GATE),

said MPCP requester including:

a class-based buffer counter which counts a class-based buffer length, upon receipt of the control message for upstream bandwidth allocation from the grant generator; and

a request generator which generates class-based buffer length information, and transmits the control message for upstream report containing the generated buffer length information.

2. (Original) The bandwidth allocation device as set forth in claim 1, wherein the downstream control message as a grant of an upstream bandwidth request includes a grant level, a grant length, and a start time of a timeslot as a sum of a plurality of grant values of upstream slot bandwidth.

3. (Original) The bandwidth allocation device as set forth in claim 2, wherein the control message for upstream report includes a queue level, and a queue report as a sum of a plurality of queue state reports.

4. (Original) A dynamic bandwidth allocation method for an Ethernet Passive Optical Network (EPON) including an optical line termination (OLT), an optical distribution network (ODN), and a plurality of optical network units (ONU), the method comprising:

a first step of, upon receipt of a control message for upstream report from the optical network unit, checking which ONU's information is contained in the received control message, and updating a bandwidth;

a second step of, when a sum of bandwidths for HP (High Priority) of all ONUs is more than a link capacity, allocating a bandwidth proportional to the bandwidth for HP of each of the ONUs to each of the ONUs in the same order as a previously allocated order of ONUs, if there is a previously allocated order of ONUs;

a third step of, when the sum of bandwidths for HP (High Priority) of all ONUs is less than the link capacity, allocating a bandwidth equal to the bandwidth for HP to each of the ONUs;

a fourth step of, when a sum of the bandwidths for HP and MP (Medium Priority) of all ONUs is more than the link capacity, using a bandwidth remaining after the allocation for the bandwidths for HP to additionally allocate a bandwidth proportional to the bandwidth for MP of each of the ONUs to each of the ONUs;

a fifth step of, when the sum of the bandwidths for HP and MP of all ONUs is less than the link capacity, using a bandwidth remaining after the allocation for the bandwidths for HP to additionally allocate a bandwidth equal to the bandwidth for MP of each of the ONUs to each of the ONUs;

a sixth step of, when a sum of maximum bandwidths of all ONUs is more than the link capacity, using a bandwidth remaining after the allocation for the bandwidths for HP and MP to additionally allocate a bandwidth proportional to the bandwidth for LP (Low Priority) of each of the ONUs to each of the ONUs; and

a seventh step of, when the sum of the maximum bandwidths is less than the link capacity, allocating an additional bandwidth to each of the ONUs so that a total bandwidth allocated to each of the ONUs is equal to the maximum bandwidth of each of the ONUs, and

equally dividing a bandwidth remaining after the bandwidth allocation for the maximum bandwidth to be additionally allocated as a bandwidth for LP to each of the ONUs.

5. (Original) The dynamic bandwidth allocation method as set forth in claim 4, wherein the first step is performed in such a manner that, when the control message for upstream report is received from the optical network unit, it is checked which ONU's information is contained in the received control message, and a request bandwidth for HP, which corresponds to queue length information for HP/update period, is updated, and a request bandwidth for MP, which corresponds to queue length information for MP/update period, is updated, and a request bandwidth for LP, which corresponds to queue length information for LP/update period, is further updated.

6. (Original) The dynamic bandwidth allocation method as set forth in claim 4, wherein

the high priority service is a service having requirements of end-to-end delay and jitter of the services of the ONUs,

the medium priority service is a service which is sensitive to the delay but requires a predetermined bandwidth, and

the low priority service is a BETC (Best Effort Traffic Class) service which has no requirement of end-to-end delay and jitter, and is assigned a marginal bandwidth.

7. (Original) A computer-readable recording medium enabling a computer to performs:

a first step of, upon receipt of a control message for upstream report, checking which ONU's information is contained in the received control message, and updating a bandwidth;

a second step of, when a sum of bandwidths for HP of all ONUs is more than a link capacity, allocating a bandwidth proportional to the bandwidth for HP of each of the ONUs to each of the ONUs in the same order as a previously allocated order of ONUs, if there is a previously allocated order of ONUs;

a third step of, when the sum of bandwidths for HP of all ONUs is less than the link capacity, allocating a bandwidth equal to the bandwidth for HP to each of the ONUs;

a fourth step of, when a sum of the bandwidths for HP and MP of all ONUs is more than the link capacity, using a bandwidth remaining after the allocation for the bandwidths for HP to additionally allocate a bandwidth proportional to the bandwidth for MP of each of the ONUs to each of the ONUs;

a fifth step of, when the sum of the bandwidths for HP and MP of all ONUs is less than the link capacity, using a bandwidth remaining after the allocation for the bandwidths for HP to additionally allocate a bandwidth equal to the bandwidth for MP of each of the ONUs to each of the ONUs;

a sixth step of, when a sum of maximum bandwidths of all ONUs is more than the link capacity, using a bandwidth remaining after the allocation for the bandwidths for HP and MP to additionally allocate a bandwidth proportional to the bandwidth for LP of each of the ONUs to each of the ONUs; and

a seventh step of, when the sum of the maximum bandwidths is less than the link capacity, allocating an additional bandwidth to each of the ONUs so that a total bandwidth allocated to each of the ONUs is equal to the maximum bandwidth of each of the ONUs, and equally dividing a bandwidth remaining after the bandwidth allocation for the maximum bandwidth to be additionally allocated as a bandwidth for LP to each of the ONUs.